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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,043	08/19/2004	Shaun Crawford	BUR920040095US1	5042

44152 7590 01/10/2006

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EXAMINER	
GREEN, PHILLIP	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/711,043	CRAWFORD ET AL.	
	Examiner	Art Unit	
	Phillip S. Green	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 August 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *08/19/04, 08/3004/*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 08/19/2004 and 08/30/2004 was filed after the mailing date of the application on 08/19/2004. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "14" and "19" have both been used to designate opaque material. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Hamada et al. (US 2004/0241579 A1).

Pertaining to claim 1, Hamada discloses a method of photoresist trimming, comprising the steps of:

forming a resist foot in a trench; and

removing the resist foot found in the trench during a trimming process. (Note: Paragraph 0192-0194. As stated in the applicant's paragraph 0004, a mask foot is an extension of mask material extending from a mask sidewall into the opening in the mask bound by the sidewall and is an unwanted resist or scum forming a generally sloping structure on the sidewall. Hamada in Paragraph 0193 discloses an uneven, unwanted scum on the edge of the organic sidewall. The examiner takes the position the scum removed in Hamada in order to smooth the edge line is a resist foot.).

Pertaining to claim 2, Hamada discloses the above limitations of claim 1 above, including, wherein the trimming step comprises ionizing a portion of a mixture of gases

comprising O_2 and at least one other oxide gas to form an etchant for the trimming process. (Note: Paragraph 0192-0194).

Pertaining to claim 3, Hamada discloses the above limitations of claim 2 above, including, wherein the mixture of gases comprises any of at least CO_2, SO_2 and NO_2 formed by mixing during a plasma etching process. (Note: Paragraph 0192-0194).

Pertaining to claim 4, Hamada discloses the above limitations of claim 2 above, including, wherein the trimming process is performed on a mask and an upper surface of the mask is resistant to etching. (Note: Paragraph 0016-0019).

Pertaining to claim 5, Hamada discloses the above limitations of claim 4 above, including, polymerizing an upper surface of the mask. (Note: Paragraph 0016-0019).

Pertaining to claim 6, Hamada discloses the above limitations of claim 3 above, including, comprising providing a barrier on an upper surface of the mask derived from an oxide gas. (Note: Paragraph 0016-0019).

Pertaining to claim 7, Hamada discloses the above limitations of claim 3 above, including, arranging a carbon barrier on an upper surface of the mask. (Note: Paragraph 0192-0194).

Pertaining to claim 8, Hamada discloses the above limitations of claim 1 above, including, forming a sidewall in a mask which is to be trimmed during the trimming step, and etching a lower portion of the sidewall of the mask using the mixture of gases comprising O_2 and at least one other oxide gas to form the sidewall substantially perpendicular to a surface of the mask. (Note: Fig. 2).

4. Claims 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Vaartstra (US 6,242,165 B1).

Pertaining to claim 18, Vaartstra discloses a trim gas for etching a mask foot formed at a base of a sidewall pattern, comprising O_2 and at least one other oxide gas comprising at least any one of CO_2, SO_2, and NO_2. (Note: Column 5, line 19 – Column 6, line 10).

Pertaining to claim 19, Vaartstra discloses the above limitations of claim 18 above, including, the O_2 and at least one other oxide gas has a pressure ranging from about 1mT to 1000 mT. (Note: Column 5, line 19 – Column 6, line 10).

Pertaining to claim 20, Vaartstra discloses the above limitations of claim 18 above, including, the O_2 and at least one other oxide gas is configured to strengthen an upper surface of a photoresist being trimmed. (Note: Column 6, lines 11-22).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada (US 2004/0241579 A1) in view of Vaartstra (US 6,242,165 B1).

Pertaining to claim 9, Hamada discloses the limitations of claim 2 in Paragraph 3 above.

Hamada specifically fails to disclose the mixture of gases comprising O_2 and at least one other oxide gas in a ratio ranging from about 1:50 to 50:1.

Vaarstra teaches the ratio of the oxidizer component to the additional component in the supercritical state is in the range of 1:100 by volume to about 100:1 by volume. (Note: Column 6, lines 8-10).

Both Hamada and Vaarstra teach the removal of photoresist residue, therefore, they are analogues.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide the composition of gas as taught by Vaartstra to the invention of Hamada in order to achieve effective removal of organic materials. (Vaartstra, Col. 2, line 56-57).

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.)

Pertaining to claim 10, Hamada discloses the limitations of in claim 2 Paragraph 3 above.

Hamada specifically fails to disclose the mixture of gases comprising O_2 and at least one other oxide gas in a ratio ranging from about 1:10 to 10:1.

Vaarstra teaches the ratio of the oxidizer component to the additional component in the supercritical state is in the range of 1:100 by volume to about 100:1 by volume. (Note: Column 6, lines 8-10).

Both Hamada and Vaarstra teach the removal of photoresist residue, therefore, they are analogues.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide the composition of gas as taught by Vaartstra to the invention of Hamada in order to achieve effective removal of organic materials. (Vaartstra, Col. 2, line 56-57).

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in

that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.).

Pertaining to claim 11, Hamada discloses the limitations of claim 10 above.

Hamada specifically fails to disclose the mixture of gases comprising O_2 and at least one other oxide gas in a ratio ranging from about 1:3 to 3:1.

Vaarstra teaches the ratio of the oxidizer component to the additional component in the supercritical state is in the range of 1:100 by volume to about 100:1 by volume. (Note: Column 6, lines 8-10)

Both Hamada and Vaarstra teach the removal of photoresist residue, therefore, they are analogues.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide the composition of gas as taught by Vaartstra to the invention of Hamada in order to achieve effective removal of organic materials. (Vaartstra, Col. 2, line 56-57).

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in

that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.)

Pertaining to claim 12, Hamada discloses the limitations of claim 2 in Paragraph 3 above.

Hamada specifically fails to disclose holding the mixture of gases comprising O_2 and at least one other oxide gas at a pressure ranging from about 1 mT to 1000 mT.

Vaarstra teaches the chamber at a pressure above the critical temperature. (Column 10, lines 22-24).

Both Hamada and Vaarstra teach the removal of photoresist residue, therefore, they are analogues.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide the composition of gas as taught by Vaartstra to the invention of Hamada in order to achieve effective removal of organic materials. (Vaartstra, Col. 2, line 56-57).

Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise

critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966.

Pertaining to claim 13, Hamada discloses the limitations of claim 2 in Paragraph 3 above.

Hamada specifically fails to disclose the forming the trimming gas comprises mixing O_2 and at least one other oxide gas at a pressure ranging from about 1 mT to 100 mT.

Vaarstra teaches the chamber at a pressure above the critical temperature. (Column 10, lines 22-24).

Both Hamada and Vaarstra teach the removal of photoresist residue, therefore, they are analogues.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to provide the composition of gas as taught by Vaartstra to the invention of Hamada in order to achieve effective removal of organic materials. (Vaartstra, Col. 2, line 56-57).

Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process

would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

7. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deng et al. (US 2005/0045799 A1) in view of Vaartstra (US 6,242,165 B1).

Pertaining to claim 14, Deng discloses a method of forming an imaging mask, comprising the steps of:

arranging an opaque layer on a transparent substrate **(120)**;

arranging a mask material **(141)** on the opaque layer (Note: Para. 0115);

imaging the mask with a prescribed pattern; and (Note: Para. 0085)

trimming an etched mask with a trimming gas comprising O_2. (Note: Para 0115).

However, Deng does not teach the step of trimming an etched mask with a trimming gas comprising O_2 and at least one other oxide gas.

Vaartstra discloses the step of trimming an etched mask with a trimming gas comprising O_2 and at least one other oxide gas.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of applicant(s) claimed invention was made to use O_2 and at least one other

oxide gas to remove organic residue from a variety of substrate. (Note: Vaartstra, Col 2, line 27-54).

Pertaining to claim 15, Deng and Vaartstra disclose the limitations of claim 14 in the paragraph above, including, the ratio of the oxidizer component to the additional component in the supercritical state is in the range of 1:100 by volume to about 100:1 by volume. (Note: Vaartstra, Column 6, lines 8-10).

Pertaining to claim 16, Deng and Vaartstra disclose the limitations of claim 14 above, including, forming the trimming gas comprises mixing O_2 and at least one other oxide gas at a pressure ranging from about 1 mT to 100 mT. (Vaartstra, Column 10, lines 22-24).

Pertaining to claim 17, Deng and Vaartstra disclose the above limitations of claim 14 above, including, the imaging step includes the formation of a mask foot at a based of the prescribed pattern and the trimming step includes removal of the mask foot to form substantially perpendicular sidewalls of the prescribed pattern with respect to a surface thereof. (Note: Deng, Fig 3).

Correspondence

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phillip S. Green whose telephone number is (571) 272-7024. The examiner can normally be reached on Monday thru Thursday 8:30 am to 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, Note http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PG
12/28/2005

Brook Kebede

BROOK KEBEDE
PRIMARY EXAMINER